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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/628,085	07/24/2003	Dennice F. Gayme	H0005645- -1170	3521

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EXAMINER	
MANCHO, RONNIE M	
ART UNIT	**PAPER NUMBER**
3663	

DATE MAILED: 04/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/628,085	GAYME ET AL.	
	Examiner	Art Unit	
	Ronnie Mancho	3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-10, 12-14, 17-19, 21-24, 27, 28, 31, 32, 35, 36, 37 rejected under 35 U.S.C. 102(b) as being anticipated by Scott (6098011).

Regarding claim 1, Scott (abstract, figs. 1, 2&7) discloses a fault detection system for detecting faults in an aircraft system, the fault detection system comprising:

a sensor (A, B) data processor 36, 26, the sensor data processor receiving turbine sensor data from the aircraft system and augmenting the sensor data to provide an augmented data set; and

a logic inference system 40, the logic inference system receiving the augmented data set and analyzing the augmented data set to determine a likelihood that a fault (i.e. errors 28, 38; col. 3, lines 1-65) has occurred.

Regarding claim 2, Scott discloses the system of claim 1 wherein the sensor data processor augments the sensor data by determining a rate of change of the sensor data.

Regarding claim 3, Scott discloses the system of claim 1 wherein the sensor data processor augments the sensor data by generating residuals from the sensor data.

Regarding claim 4, Scott discloses the system of claim 1 wherein the sensor data processor augments the sensor data by generating residuals from the sensor data and determining a rate of change of the residuals.

Regarding claim 5, Scott discloses the system of claim 1 wherein the sensor data processor augments the sensor data by computing a margin for the sensor data.

Regarding claim 6, Scott discloses the system of claim 1 wherein the aircraft system comprises a turbine engine and wherein the sensor data comprises engine speed data, fuel flow data and exhaust gas temperature data.

Regarding claim 7, Scott discloses the system of claim 1 wherein the aircraft system comprises a turbine engine and wherein the sensor data processor receives exhaust gas temperature data and wherein the sensor data processor augments the exhaust gas temperature data by determining exhaust gas temperature margin data corresponding to a difference between the exhaust gas temperature data and a maximum safe temperature.

Regarding claim 8, Scott discloses the system of claim 1 wherein the fuzzy logic inference system includes a plurality of membership functions and wherein each of the plurality of membership functions is associated with at least one data type in the augmented data seta and wherein the logic system fuzzifies the augmented data set using the plurality of membership functions.

Regarding claim 9, Scott discloses the system of claim 8 wherein the fuzzy logic inference system includes a plurality of rules, and wherein the fuzzy logic system evaluates the fuzzified augmented data set according to the plurality of rules.

Regarding claim 10, Scott discloses the system of claim 9 wherein the fuzzy logic inference system further aggregates outputs of the plurality of rules and defuzzifies the aggregated output for input into a diagnostic system.

Regarding claim 12, Scott discloses a method of detecting faults in a turbine engine, the method comprising the steps of:

a) receiving turbine sensor data from the turbine engine;

b) creating an augmented data set from the sensor data;

c) fuzzifying the augmented data set; and

d) applying a plurality of fuzzy logic rules to the fuzzy augmented data set to determine a likelihood of a fault in the turbine engine.

Regarding claim 13, Scott discloses the method of claim 12 wherein the step of creating an augmented data set comprises

determining residuals of the sensor data and determining the slope of the residuals.

Regarding claim 14, Scott discloses the method of claim 12 wherein the step of creating an augmented data set comprises computing a margin for the sensor data.

Regarding claim 17, Scott discloses the method of claim 12 wherein the step of fuzzifying the augmented data set comprises applying the membership functions to the augmented data set.

Regarding claim 18, Scott discloses the method of claim 12 wherein the step of applying the plurality of fuzzy logic rules to determine a likelihood of a fault in the turbine engine further comprises aggregating an output of the plurality of logic rules.

Regarding claim 19, Scott discloses the method of claim 18 wherein the step of applying a plurality of logic rules to determine a likelihood of a fault in the turbine engine further comprises defuzzifying the aggregated output for input into a diagnostic system.

Regarding claim 21, Scott (abstract, columns 2-8; figs. 1-7) discloses the program product comprising:

a) a fault detection program, the fault detection program including:

a sensor data processor, the sensor data processor receiving turbine sensor data from a turbine engine and augmenting the sensor data to provide augmented data set; and

a fuzzy logic inference system, the fuzzy logic inference system receiving the augmented data set and analyzing the augmented data set to determine a likelihood that a fault has occurred; and

b) signal bearing media bearing said program.

Regarding claim 22, Scott discloses the program product of claim 21 wherein the signal bearing media comprises recordable media.

Regarding claim 23, Scott discloses the program product of claim 21 wherein the signal bearing media comprises transmission media.

Regarding claim 24, Scott discloses the program product of claim 21 wherein the sensor data processor augments the sensor data by generating residuals from the sensor data and determining a rate of change of the residuals.

Regarding claim 27, Scott discloses the program product of claim 21 wherein the 61.1.z* logic inference system includes a plurality of membership functions and wherein each of the plurality of membership function is associated with at least one data type in the augmented data

seta and wherein the fuzzy logic system fuzzifies the augmented data set using the plurality of membership functions.

Regarding claim 28, Scott discloses the program product of claim 27 wherein the fuzzy logic inference system includes a plurality of rules, and wherein the fuzzy logic system evaluates the fuzzzified augmented data set according to the plurality of rules.

Regarding claim 29, Scott discloses the program product of claim 28 wherein the fuzzy logic inference system further aggregates outputs of the plurality of rules and defuzzifies the aggregated output for input into a diagnostic system.

Regarding claim 31, Scott (figs. 1-7, abstract, columns 2-8) discloses the apparatus comprising:

a) a processor-,

b) a memory coupled to the processor;

c) a fault detection program residing in memory and being executed by the processor, the fault detection program including:

i) a sensor data processor, the sensor data processor receiving turbine sensor data from a turbine engine and augmenting the sensor data to provide augmented data set; and

ii) a logic inference system, the logic inference system receiving the augmented data set and analyzing the augmented data set to determine a likelihood that a fault has occurred.

Regarding claim 32, Scott discloses the apparatus of claim 31 wherein the sensor data processor augments the sensor data by generating residuals from the sensor data and determining a rate of change of the residuals.

Regarding claim 35, Scott discloses the apparatus of claim 31 wherein the logic inference system includes a plurality of membership functions and wherein each of the plurality of membership functions is associated with at least one data type in the augmented data set and wherein the logic system fuzzifies the augmented data set using the plurality of membership functions.

Regarding claim 36, Scott discloses the apparatus of claim 35 wherein the fuzzy logic inference system includes a plurality of rules, and wherein the logic system evaluates the fuzzifed augmented data set according to the plurality of rules.

Regarding claim 37, Scott discloses the apparatus of claim 36 wherein the fuzzy logic inference system further aggregates outputs of the plurality of rules and defuzzises the aggregated output for input into a diagnostic system.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 11, 15, 16, 20, 25, 26, 30, 33, 34, 38, are rejected under 35 U.S.C. 103(a) as being unpatentable over Scott in view of Ling et al (5718111).

Regarding claim 11, Scott discloses the system of claim 10 wherein the aircraft system comprises a turbine engine and sensor data. Scott just mentioned a group of sensors generally sensing different parameters. Scott did not particularly mention the particular parameter sensed.

However, Ling et al teaches of sensors in an aircraft turbine engine wherein the sensor data comprises exhaust gas temperature data, engine speed data, and fuel flow data, and wherein a sensor data processor augments the sensor data by generating residuals from the exhaust gas temperature data, engine speed data and fuel flow data and wherein the sensor data processor further augments the sensor data by determining a rate of change of the residuals, and wherein the sensor data processor further augments the sensor data by determining a margin for the exhaust temperature data corresponding to a difference between the exhaust gas temperature data and a maximum safe temperature.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Scott device as taught by Ling for the purpose of measuring or sensing particular parameters.

Regarding claims 15, 16, 20, 25, 26, 30, 33, 34, 38, Scott discloses the method of claim 12, but did not mention the particular parameters senses by the sensors. However, Ling et al teaches the following:

In claim 15, sensor data comprising engine speed data fuel flow data and exhaust gas temperature data;

In claim 16, sensor data includes exhaust gas temperature data and wherein the step of augmenting the sensor data comprises determining an exhaust gas temperature (EGT) margin from the exhaust gas temperature, the EGT margin corresponding to a difference between the exhaust gas temperature data and a maximum safe temperature;

In claim 20. sensor data comprises exhaust gas temperature data, engine speed data, and fuel flow data, and wherein the step of creating an augmented data set from the sensor data

comprises generating residuals from the exhaust gas temperature data, engine speed data, and fuel flow data, and wherein the step of creating an augmented data set from the sensor data further comprises determining a rate of change of the residuals, and wherein the step of creating an augmented data set from the sensor data further comprises determining a margin for the exhaust gas temperature data corresponding to a difference between the exhaust gas temperature data and a maximum safe temperature;

In claim 25, sensor data comprises engine speed data, fuel flow data and exhaust gas temperature data;

In claim 26, sensor data processor receives exhaust gas temperature data and wherein the sensor data processor augments the exhaust gas temperature data by determining exhaust gas temperature margin data corresponding to a difference between the exhaust gas temperature data and a maximum safe temperature;

In claim 30, sensor data comprising exhaust gas temperature data, engine speed data, and fuel flow data and wherein a sensor data processor augments the sensor data by generating residuals from the exhaust gas temperature data, engine speed data, and fuel flow data, and wherein the sensor data processor further augments the sensor data by determining a rate of change of the residuals, and wherein the sensor data processor further augments the sensor data by determining a margin for the exhaust gas temperature data corresponding to a difference between the exhaust gas temperature data and a maximum safe temperature;

In claim 33, sensor data comprises engine speed data, fuel flow data and exhaust gas temperature data;

In claim 34, sensor data processor receives exhaust gas temperature data and wherein the sensor data processor augments the exhaust gas temperature data by determining exhaust gas temperature margin data corresponding to a difference between the exhaust gas temperature data and a maximum safe temperature;

In claim 38. sensor data comprising exhaust gas temperature data, engine speed data, and fuel flow data, and wherein the sensor data processor augments the sensor data by generating residuals from the exhaust gas temperature data,

engine speed data, and fuel flow data and wherein the sensor data processor further augments the sensor data by determining a rate of change of the residuals, and wherein the sensor data processor further augments the sensor data by determining a margin for the exhaust gas temperature data corresponding to a difference between the exhaust gas temperature data and a maximum safe temperature.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Scott device (claims 15, 16, 20, 25, 26, 30, 33, 34, 38) as taught by Ling for the purpose of measuring or sensing particular parameters.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following: US005961314A , US005406787A , US006073262A, US006301572B1, all disclose sensing aircraft parameters.

Communication

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ronnie Mancho whose telephone number is 571-272-6984. The examiner can normally be reached on Mon-Thurs: 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Black can be reached on 571-272-6956. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ronnie Mancho
Examiner
Art Unit 3663

4/18/05

SUPERVISORY PATENT EXAMINER
GROUP 3600